Institute of Computer Science
AS CR, public research institute

Research Highlights from the Institute of Computer Science

Jiří Wiedermann
director

www.cs.cas.cz

Outline

- Brief history
- Figures
- Research departments & highlights

History

- 1975 General Computing Centre of CSAS
- 1991 Institute of Computer Science and Computing Machinery
- 1998 Institute of Computer Science of AS CR
- 2007 Institute of Computer Science of AS CR, p. r. i. (a public research institute)

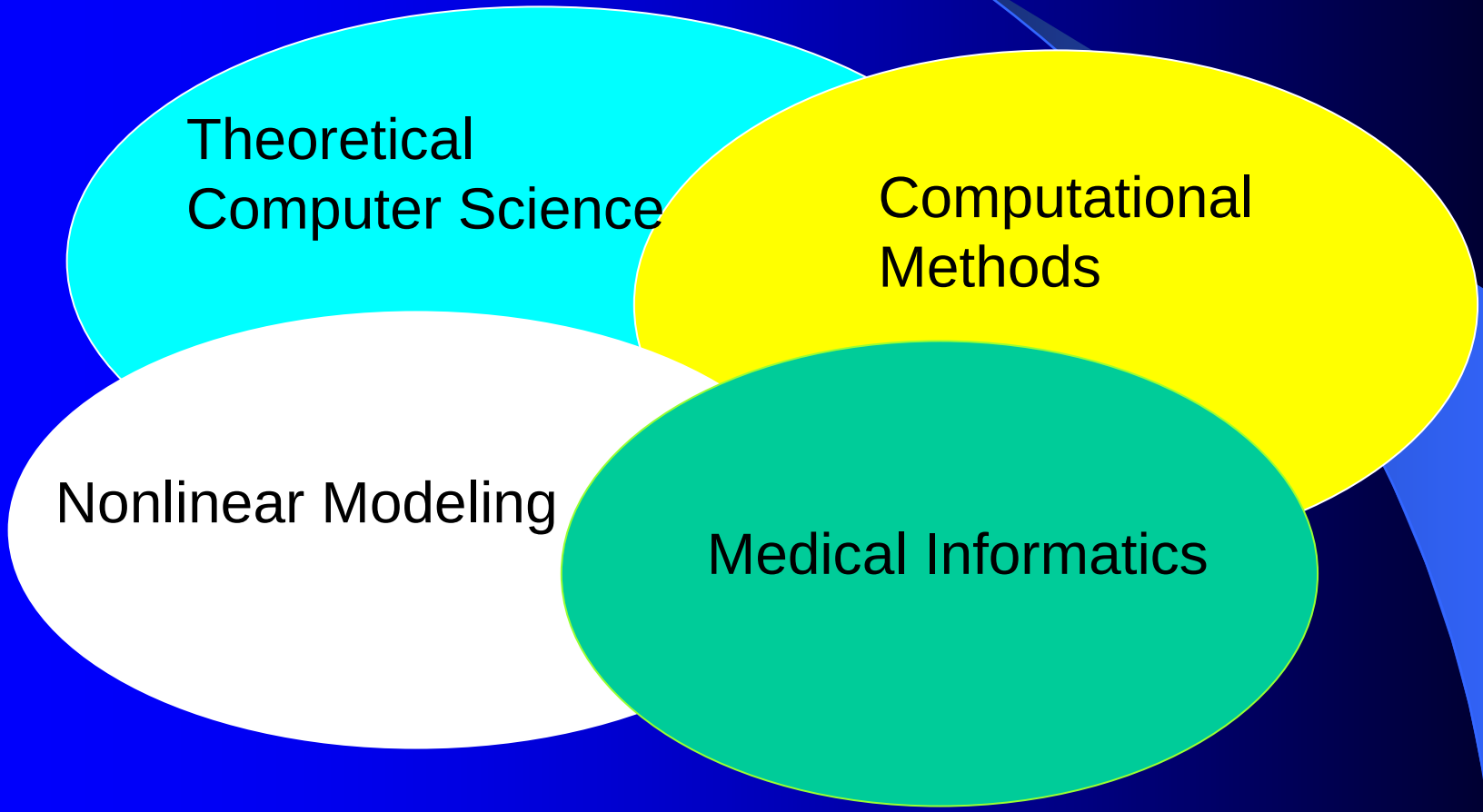
Figures

- 170 employees (inclusively the administration)
- 130 scientists
- approx. 40 PhD students
- approx. 80 scientists with PhD degree
- approx. 20 professors

Budget: public money : 45 mil. CZK
"research money": 45 mil. CZK

ICS Council
Supervisory Board

ICS Research departments



Theoretical Foundations of Computer Science

School of fuzzy logic

P. Hájek: Metamathematics of Fuzzy Logic, Kluwer 1998
(opened a new branch of mathematical logic)

knowledge mining : methods related to P. Hajek's school
(e.g. GUHA method for ***data-mining***)

Non-standard models of computing

Theoretical studies in interactive computing, cognitive computing, molecular computing, amorphous computing, nano-computing, ad-hoc nets, etc.

Mathematical theory of neurocomputing and learning

Computational cryptography (O. Strauch, S. Porubsky: Distribution of Sequences, Peter Lang GmbH 2005)

Computational Methods and Mathematical Modeling

School of numerical linear algebra (prof. Strakoš):
iterative methods for solution of large-scale linear systems

Rigorous coupled wave analysis ***(light diffraction on periodic media)***

Interactive system for universal functional optimization ***UFO***

models of underground water flow ***(environment protection)***

matrix theory, interval computations for problems with inexact data

biomechanics ***total knee joint replacement and verification***

Neuroinformatics, Environmental Informatics and Nonlinear Modeling

Neural networks

- cognitive computation and hybrid methods of computational intelligence
- robotic models on classification, control, and cognitive tasks
- multivariate nonlinear data processing

Modeling of complex systems

- ***weather and air pollution modeling and forecasting***
  - **project MEDARD** - *Meteorological and Environmental Data Assimilating system for Regional Domains*

Time series analysis and nonlinear dynamics

- *identification of dependence, synchronization and causality*
  - **EU project BRACCIA -** *Brain, Respiration And Cardiac Causalities In Anaesthesia*

Medical/Health Informatics and Bioinformatics

Data, Information and Knowledge in Biomedicine

- new approaches to measure information measuring in empirical and theoretical knowledge.
- extracting knowledge from clinical and genetic databases for early detection of elevated risk of myocardial infarction and/or stroke.

Electronic Health Record (EHR), Telemedicine and eHealth

- lifelong structured EHR for applications in cardiology and dental medicine
- **Electronic Dental Cross** including implementation of bi-directional voice interaction with dental HER
- R&D on interoperability and standards for telemedicine and eHealth.
- tools to improve management of shared patient care, e.g. advanced information kiosks for hospitals and out-patient cardiology

Decision Support, Knowledge Discovery and Advanced Statistics

- New formalization methods of medical guidelines for decision support in cardiology.
- decision support system for Hospital Emergency Services
- new methods of identification of an individual for forensic purposes (criminalistics, forensic medical genetics)